Chapter 1
Introduction

1-1. Purpose

The U.S. Army Corps of Engineers (USACE), as part of their hazardous, toxic, and radioactive waste (HTRW) programs, conduct site investigation and remedial action projects in an efficient, cost-effective, and technically-sound manner. This Engineer Manual (EM) assists in this process by providing guidance to USACE personnel responsible for designing and conducting real-time, fixed-fenceline sample collection and monitoring systems (FFMS) as part of an air quality monitoring programs at (HTRW) sites. The EM specifically addresses the selection, set-up, and operation of sampling and analytical equipment; quality assurance/quality control (QA/QC) and data management requirements. Guidance for developing standard operating procedures and associated information is also presented, in applicable appendices.

1-2. Applicability

This EM applies to USACE commands having responsibility for ambient air measurements associated with HTRW site investigation and remediation projects. This EM is intended to present its users with the requirements necessary to monitor the release of volatile organics and other compounds at the perimeter of an HTRW site using a FFMS monitoring system. The requirements for such a system normally address six technical areas: 1) Monitoring location, 2) Monitoring frequency, 3) Instrumentation, 4) Action limits, 5) Meteorological monitoring and 6) Documentation and recordkeeping.

This EM can provide technical support to USACE design and/or construction personnel responsible for the requirements involved in the design, implementation, and operation of a real-time, fixed-fenceline sample collection and monitoring system for HTRW projects including: 1) Ordinance and Explosive (OE), 2) Defense Environmental Restoration Programs (DERP), 3) Base Realignment and Closure (BRAC), 4) Installation Environmental Compliance, 5) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or Superfund, 6) Resource Conservation and Recovery Act (RCRA) and, 7) Applicable civil and military projects.

1-3. References

The references used in the text of this EM along with additional references which may support the design, installation and operation of a FFMS are included in Appendix A.

1-4. Scope

This EM can be useful to USACE personnel responsible for the development and implementation of a real-time, fixed-fenceline monitoring system for the collection and measurement of both background and fenceline migration of onsite generated volatile air contaminants. The EM assumes the decision has been made to use such a real-time, fixed-fenceline monitoring approach either as a stand alone monitoring system or as part of a more extensive air monitoring program. NOTE: Perform an Air Pathway Analysis (APA), as specified in EPA-450/1-89-001a and EP 1110-1-21, before designing an air monitoring system. Results of the APA should be used to determine the need for ambient air monitoring and if so determined would assist in the development of an appropriate HTRW Air Monitoring Plan. The EM includes the sample collection design requirements based on site environment, site specific contaminants, and the data quality objectives established for the monitoring. The EM will assist in providing an understanding as to which design approaches are best suited for a given project data requirement. This EM addresses the design of a perimeter air monitoring system which can be used during site investigation, feasibility studies, and remedial actions and provides direction for the actual installation and operation of such fenceline monitoring systems.

1-5. Overview of Manual

The EM is organized into eight chapters and seven appendices. Chapter 1 is the *Introduction*. Chapter 2, *How to Use This Manual*, describes the relationship between the EM and the major steps in planning and executing a fenceline ambient air monitoring program. Chapter 3, *Monitoring Objectives and Technological Options*, discusses the tasks that are crucial to the planning process, including determining data quality objectives, identifying regulatory limits and action levels, investigating properties of any hazardous air contaminants at the site, and assessing technical considerations and constraints in designing a monitoring program. Chapter 4, *Function of the Analytical Center*, describes the analytical center's components and design, operational options, contingency and reference method monitoring, and communication between system components. Chapter 5, *Requirements for the Collection System*, discusses all aspects of the collection system, including design, construction, and operation; sample conditioning and transportation; preventative maintenance and corrective action; and time-integrated and real-time monitoring requirements. Chapter 6, *Meteorological Monitoring System*, presents the objectives of sampling system control, meteorological monitoring concepts, integration of the analytical center with the meteorological monitoring system, and program action levels and response. Chapter 7, *Data Management System*, highlights all aspects of a data management system, including design and operation of the data acquisition system; data compilation, storage, transmission, and reporting; and data validation and quality assessment. Chapter 8, *Quality Assurance/Quality Control Requirements*, presents basic QA/QC principles, the approach to quality planning, data characterization, and specific applications to fenceline monitoring.

The appendices of this EM play an important part in the design and implementation of a FFMS at a HTRW site. They provide additional guidance and information useful to the design and operation of the monitoring program. Following is a brief discussion of each appendix provided in this EM.

- **Appendix A--References**. Appendix A contains an up-to-date list of references supporting citations in this manual and associated literature sources relevant to establishing a FFMS at a HTRW site

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- **Appendix B--Acronyms and Definitions**. As with any document which uses acronyms and technical terminology, an accurate and reliable list of acronyms and technical definitions must be provided. Appendix B provides a list of acronyms and definitions used in this EM along with additional terms unique to the technical field of air monitoring.

- **Appendix C--Guidelines for Developing Standard Operating Procedures (SOPs) for Fenceline Monitoring**. To obtain reliable results, adherence to prescribed methodology is imperative. Appendix C provides guidelines for preparing and implementing SOPs relative to the FFMS program. Example format and content of typical USACE approved SOPs are provided.

- **Appendix D--National Technical Guidance Series, Bulletin Boards, and Electronic Data Bases**. The efficiency with which a fenceline air monitoring program can be developed and implemented is highly dependent on the extent and quality of technical information available during the development phases of the program. Appendix D provides information on assessing various federal, state and commercial databases, electronic bulletin boards and fact sheets pertinent to FFMSs at HTRW sites.

- **Appendix E--Conversion Factors for Common Air Pollution Measurements and Other Useful Information for HTRW Sites**. Appendix E provides convenient conversion tables and factors associated with air monitoring measurement systems used at HTRW sites. Information in this appendix assist the USACE engineer in confronting a multitude of confusing and conflicting emission units presented in various project documents.

- **Appendix F--Manufacturers of Sampling and Analytical Equipment**. This appendix provides examples of some of numerous commercially available sampling and analytical systems and equipment which could be available and suitable for monitoring both time-integrated and real-time emissions from HTRW sites as part of a FFMS program.

- **Appendix G--Development of a Target Compound List**. Development of a site-specific target compound list (TCL) as part of a FFMS at a HTRW site is a key factor in the success of the program. Appendix F provides guidelines and details on how to develop a site-specific TCL using a simple algorithm involving health effects data, emission data, risk information, availability of sampling/analytical methodologies and regulatory requirements.